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Applicants submit that there is no motivation from WO 97/45568 to select the particular amino-phenolic polymers of applicants' claim 21, subpart (g), or acrylic polymers of applicants' claim 22, subpart (f), from among the many amino-phenolic polymers and acrylic polymers described in WO 97/45568, to form a phosphatizing composition in combination with that of Endo et al.

Applicants' invention and disclosure

Applicants' claim 21 is drawn to a liquid composition suitable for use as a dry-in-place phosphating composition for galvanized steel including amino-phenolic polymers which are selected as adhesion promoting substances. Applicants' claim 22 is drawn to a liquid composition suitable for use as a dry-in-place phosphating composition for galvanized steel including film-forming acrylic polymers which are selected as adhesion promoting substances.

In a dry-in-place phosphatizing treatment, a liquid layer of a composition is formed over the substrate surface to be treated in the process and then dried into place without any intermediate rinsing. Thus, the entire non-volatiles content of the liquid layer initially formed, possibly modified by chemical reaction with the surface being treated, remains in place as the coating formed in a process according to the invention. (Specification, page 13, lines 5-10)

As stated on page 1 of applicants' specification a phosphate coating is normally formed by a chemical reaction between the metal substrate and the phosphating composition. Thus, if the phosphating composition is in contact with the substrate for at least about five seconds at a temperature not more than 70 °C and any liquid phosphating composition remaining in contact with the conversion coating thus formed is rinsed off before the substrate treated with it is dried, the phosphate coating formed generally is microcrystalline. On the other hand, if the phosphating composition is applied to the substrate and dried in place without rinsing, the coating formed is usually predominantly amorphous. Thus, the specific benefit achieved by applicants' dry-in-place composition is improved adhesion to subsequently applied paint, elastomers, sealants, and like coatings and adhered structural members, particularly when the

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conversion coated object that has been painted or adhered to an elastomeric and/or sealant type structural member is to be mechanically deformed after having been thus painted or adhered. (Specification page 2, lines 10-14.) Improved adhesion by addition of the selected amino-phenolic polymers of applicants' claim 21, subpart (g), is demonstrated in Table 5 on page 20 of the specification.

The Endo et al invention and disclosure

The object of the Endo et al. invention, on the other hand, as stated in column 1, lines 7-14, is: ". . . a process for forming a phosphate film on a metal surface, which is specifically suitable for cationic electrocoating and is excellent in film adhesion, corrosion resistance and especially hot brine resistance, and scab corrosion resistance." (underlining added)

At column 3, lines 10-15, Endo et al. states further:

"According to the present invention, the abovementioned and other objects can be attained with a process for phosphating a metal surface with an acidic aqueous phosphate solution containing 0.01 to 10 g/l of colloidal particles having an isoelectric point of 3 or less and an average particle diameter of 0.1 μ or less. (underlining added)"

And, at column 3, lines 32-44, Endo et al. states further:

In an actual operation, a metal surface is first subjected to a spray treatment and/or a dip treatment with an alkaline degreasing agent at 20° ~ 60° C. for about 2 minutes and washed with tap-water. Then, in the case of dip treatment, the washed metal is treated with a surface conditioner by spraying and/or dipping in the surface conditioner solution at a room temperature for 10.about.30 seconds, and subsequently, thus treated metal is subjected to the present process, i.e. treating the metal surface with the present acidic aqueous phosphate solution at 20° ~ 70° C. for 15 seconds or more, by dipping and/or spraying means, and finally washed with tap-water and then with a deionized water.
(underlining added)

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At column 4, line 58 to column 5, line 4, Endo et al states:

"As the colloidal particles, one or more than 2 of the following may be advantageously used: Silica particles (e.g. Snow Tex O, trademark, Nissan Kagaku Kogyo K.K., particle diameter 10 ~ 20 μ p., isoelectric point 2); Silica alumina particles (e.g. Snow Tex AK, trademark, Nissan Kagaku Kogyo K.K., average diameter 10 ~ 20 μ p., isoelectric point 3 or less); Silica-Titania particles (e.g. Ceramica U-1000, trademark, Nichiban Kenkyusha, isoelectric point 3 or less); Silica-Zirconia particles (e.g. Ceramica G-1500, trademark, Nichiban Kenkyusha, isoelectric point 3 or less); antimony oxide (e.g. A-1550, trademark Nissan Kagaku Kogyo K.K., average diameter 20 ~ 50 μ p., isoelectric point 3 or less); and acrylic resin particles prepared by the method of Japanese Patent Publication No. 43362/61."

The "(3) Treating process" sequences shown near the top of columns 7 and 8 of Endo et al. both show "water rinsing" and "pure water rinsing" prior to "drying". This confirms the quoted statement at column 3, lines 32-44, which indicates that Endo et al. is trying to achieve a microcrystalline coating instead of an amorphous coating as is achieved with applicants' composition for dry-in-place application. Additionally, there is no mention in Endo et al. of the treated object later being subjected to a mechanical deforming operation.

The WO 97/455689 invention and disclosure

In the first paragraph at the top of page 1 WO 97/455689 states: "This invention also relates to the use of such [phosphatizing] processes as pre-treatment of metal surfaces for subsequent coating, in particular an electrocoating or a powder coating." One object of WO 97/455689 is thus similar to that of Endo et al. - but dissimilar to that of applicants' invention.

However, the main object of WO 97/455689 is stated on page 4, lines 13-16, as follows:

"An object of the present invention is to provide a phosphatizing solution which satisfies the corrosion protection standards of the automobile industry and in the case of which the passivating rinse may be omitted." (underlining added)

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According to the invention of WO 97/455689, the passivating rinse step (i.e., the step prior to the phosphatizing treatment step) is omitted by the inclusion of organic polymers in the phosphatizing solution. The polymers which may be used are described by six generic formulas whose description takes six pages of text - potentially encompassing thousands of polymers. The polymers may, for example, be selected from poly-4-vinylphenol compounds corresponding to general formula (II).

At page 14, lines 16-25, WO 97/455689 states:

Further examples of such polymers are condensation products of polyvinyl phenol with formaldehyde or paraformaldehyde and with a secondary organic amine. Here it is preferable to start from polyvinylphenols having a molecular weight of 1,000 to about 10,000. Particularly preferred condensation products are those wherein the secondary organic amine is selected from methylethanamine and N-methylglucamine.

Within the stated concentration ranges the organic polymers are stable in the phosphatizing baths and do not lead to precipitation. They also show no adverse effects on the layer formation and hence do not lead, for example, to the manifestation of passivation, which may inhibit the growth of the phosphate crystals, on the metal surface."

(underlining added)

That WO 97/455689 is also directed to a normal phosphatizing process (as is Endo et al.), as opposed to applicants' dry-in-place process, is further confirmed by the inclusion of step 5 "Rinsing with demineralized water" on page 18, line 9, which step follows the phosphatizing/passivating step of the WO 97/455689 invention.

The lack of a suggestion of the combination of Endo et al. and WO 97/455689

The subject rejection is for obviousness under 35 USC §103(a) and not for anticipation under 35 USC §102(b). That, as stated by the examiner, the scope of the amino-phenol polymers and the acrylic polymers in the myriad organic polymers of WO 97/455689 includes (or inherent) those in applicants' claims 21(g) and 22(f) is not sufficient to establish a prima facie case of obviousness. The suggestion to select the polymers selected by applicants must come from Endo et al. and WO 97/455689

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themselves, not from applicants' claims. Applicants submit that such suggestion is not present in either reference disclosure.

Although Endo et al. and WO 97/455689 are both trying to obtain microcrystalline phosphatizing coatings particularly suitable for subsequent electrocoating, they use different criteria to achieve their respective inventions. Endo et al. uses an acidic aqueous phosphate solution containing 0.01 to 10 g/l of colloidal particles having an isoelectric point of 3 or less and an average particle diameter of 0.1 μ , or less. However, in WO 97/455689, there is no discussion of colloidal particles or polymer particles having either of these criteria. Although acrylic resin particles prepared by the method of Japanese Patent Publication No. 43362/61 are included in the description of suitable colloidal particles for use in the invention of Endo et al., they too must meet the desired isoelectric point and size characteristics. These criteria direct the art skilled person away from the criteria set out in applicants' claims 21(g) and 22(f).

Nor, is there a particular basis in WO 97/455689 itself to select from the many the amino-phenol polymers and the acrylic polymers disclosed therein such the amino-phenol polymers and the acrylic polymers having all four of the criteria set out for the amino-phenol polymers and the acrylic polymers in applicants' claims 21(g) and 22(f).

Regarding the inclusion of Ca⁺² as included in applicants' claim 21(f), WO 97/455689, at page 8, lines 27-30 states:

When hard water is used, the phosphatizing baths may in addition contain the hard-ness -producing cations Mg(II) and Ca(II) in a total concentration of up to 7 mmole/l. Mg(II) or Ca(II) may also be added to the phosphatizing bath in quantities of up to 2.5 g/l."

The first quoted sentence is a statement of fact about hard water. The second quoted sentence does not provide a basis for adding Ca⁺² to the phosphatizing compositions of Endo et al. It does not even provide a basis for adding Ca⁺² to the phosphatizing compositions of WO 97/455689 itself.

As the examiner notes, Endo et al. does not teach the addition of hydroxylamine or iron cations to its phosphatizing compositions including the noted colloidal particles. WO 97/455689 does teach the addition of hydroxylamine or iron cations to its

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phosphatizing compositions. However, this teaching does not necessarily imply that either additive would be suitable for the compositions of Endo et al. - which is concerned with the addition of particles having colloidal properties.

Endo et al. at column 4, lines 32-36, states:

Since the pH of the present acidic aqueous phosphate solution is within a range of 3.- 4, the colloidal particles used in the present invention are acidic particles capable of being electrified in negative in an acidic aqueous phosphate solution.

When the colloidal particles having an isoelectric point of more than 3 are used in the present phosphate solution, these particles are aggregated, resulting sludges, and the intended objects of modification of phosphate film can not be attained therewith.

As a phosphating accelerator, one or more of the following may be advantageously used:

- (i) from 0.01 to 0.5 g/l, preferably 0.01 to 0.4 g/l, of nitrite ion,
- (ii) from 0.05 to 5 g/l, preferably 0.1 to 4 g/l, of m-nitrobenzene sulfonate, and
- (iii) from 0.5 to 10 g/l, preferably 1 to 8 g/l of hydrogen peroxide (based on 100% H₂O₂)
(underlining added)

When the content of phosphating accelerator is less than the defined amounts, it is unable to get a fully satisfiable phosphate film on an iron-based surface, often resulting yellow rusts, and when the content of phosphating accelerator exceeds over the upper limit, there is a tendency that uneven, blue-colored phosphate film be formed on an iron-based surface.

Thus, the Endo et al. inventors considered the pH of their phosphatizing composition and the tendency of the colloidal particles therein to form sludge when arriving at a selection of only three accelerators and their amounts. Applicants submit that this specific selection negates the potential inclusion of hydroxylamine or iron cations in the phosphatizing composition of Endo et al.

For these reasons, applicants respectfully submit that claims 21 and 22 are patentable over Endo et al. in view of WO/45568.

Allowance of the application is respectfully solicited.

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Respectfully submitted,

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